

SEQUENCE LISTING

<110> Randall, Douglas D.
Johnston, Mark L.
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Luethy, Michael H.
Mooney, Brian P.

<120> USE OF DNA ENCODING PLASTID PYRUVATE DEHYDROGENASE AND
BRANCHED CHAIN OXOACID DEHYDROGENASE COMPONENTS TO
ENHANCE POLYHYDROXYALKANOATE BIOSYNTHESIS IN PLANTS

<130> UMO 1482

<140> 09/108,020

<141> 1998-06-30

<150> 60/051,291

<151> 1997-06-30

<150> 60/055,255

<151> 1997-08-01

<150> 60/076,544

<151> 1998-03-02

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<170> PatentIn Ver. 2.1

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Phe Gly Asp Gly Thr Cys Asn Asn Gly Gln Phe Phe Glu Cys Leu Asn
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Lys Pro Phe Asp Leu His Thr Ile Gly Asn Ser Val Lys Lys Thr His
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Ser Leu Thr Ala Ala Ile Asn Glu Asn Phe His Asp Tyr Leu Asp Ala
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Ala Asp Met Asp Val Glu Thr Phe Tyr Asp Gly Tyr Leu Ala Ala Ile
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Thr Ala Val Ser Asp Gly Pro Arg Lys Thr Val Ala Thr Pro Tyr Ala
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Pro Gln Ala Ala Gly Val Gly Tyr Ser Leu Lys Met Asp Lys Lys Asn
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gtaagcagag tttgtggtct ggatactcca tttcctcttg tgtttgaacc attctacatg 1140
cccaccaaga acaagatatt ggatgcaatc aaatcgactg tgaattacta gccgtactat 1200
ctgtagttta ctgtttacac taggactaat gtaatcgcat gtctttgtta tcaattcgtc 1260
taatgtaaca ctaccgatta actttaatga atttcaagat aacgaaaaaa aaaaaaaaa 1319
  
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<210> 14
 <211> 352
 <212> PRT
 <213> Arabidopsis thaliana

<400> 14

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Met Ala Ala Leu Leu Gly Arg Ser Cys Arg Lys Leu Ser Phe Pro Ser
  1             5             10             15

Leu Thr His Gly Ala Arg Arg Val Ser Thr Glu Thr Gly Lys Pro Leu
      20             25             30

Asn Leu Tyr Ser Ala Ile Asn Gln Ala Leu His Ile Ala Leu Asp Thr
      35             40             45

Asp Pro Arg Ser Tyr Val Phe Gly Glu Asp Val Gly Phe Gly Gly Val
      50             55             60

Phe Arg Cys Thr Thr Gly Leu Ala Glu Arg Phe Gly Lys Asn Arg Val
  
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65

70

75

80

Phe Asn Thr Pro Leu Cys Glu Gln Gly Ile Val Gly Phe Gly Ile Gly
85 90 95

Leu Ala Ala Met Gly Asn Arg Ala Ile Val Glu Ile Gln Phe Ala Asp
100 105 110

Tyr Ile Tyr Pro Ala Phe Asp Gln Ile Val Asn Glu Ala Ala Lys Phe
115 120 125

Arg Tyr Arg Ser Gly Asn Gln Phe Asn Cys Gly Gly Leu Thr Ile Arg
130 135 140

Ala Pro Tyr Gly Ala Val Gly His Gly Gly His Tyr His Ser Gln Ser
145 150 155 160

Pro Glu Ala Phe Phe Cys His Val Pro Gly Ile Lys Val Val Ile Pro
165 170 175

Arg Ser Pro Arg Glu Ala Lys Gly Leu Leu Leu Ser Cys Ile Arg Asp
180 185 190

Pro Asn Pro Val Val Phe Phe Glu Pro Lys Trp Leu Tyr Arg Gln Ala
195 200 205

Val Glu Glu Val Pro Glu His Asp Tyr Met Ile Pro Leu Ser Glu Ala
210 215 220

Glu Val Ile Arg Glu Gly Asn Asp Ile Thr Leu Val Gly Trp Gly Ala
225 230 235 240

Gln Leu Thr Val Met Glu Gln Ala Cys Leu Asp Ala Glu Lys Glu Gly
245 250 255

Ile Ser Cys Glu Leu Ile Asp Leu Lys Thr Leu Leu Pro Trp Asp Lys
260 265 270

Glu Thr Val Glu Ala Ser Val Lys Lys Thr Gly Arg Leu Leu Ile Ser
275 280 285

His Glu Ala Pro Val Thr Gly Gly Phe Gly Ala Glu Ile Ser Ala Thr
290 295 300

Ile Leu Glu Arg Cys Phe Leu Lys Leu Glu Ala Pro Val Ser Arg Val
305 310 315 320

Cys Gly Leu Asp Thr Pro Phe Pro Leu Val Phe Glu Pro Phe Tyr Met

Pro Thr Lys Asn Lys Ile Leu Asp Ala Ile Lys Ser Thr Val Asn Tyr
 340 345 350

<210> 15
 <211> 1450
 <212> DNA
 <213> Arabidopsis thaliana

<400> 15

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 caccggtttc tccgcccatt cagctcgtca tctgtttget ctccgccgtt ccgggtaccg 120
 gagtatcttt ctcaatcgtc ttcctctccg gcgtcgcgcc cattctttgt tcaccctccc 180
 actttgatga aatgggggtg aggaagtaga agctggtttt cgaacgaagc catggccact 240
 gattcaaatt cagggttaat tgatgtgcca ctagctcaaa ctggggaagg tattgctgaa 300
 tgtgagcttc tcaagtgggt tgtcaaagag ggagattctg tggaagagtt tcagccactc 360
 tgtgaagttc agagcgataa agcaactata gagatcacia gtcgttttaa agggaaagtg 420
 gctctgattt cacattctcc aggtgacatt attaagggtg gagagactct ggtagggtg 480
 gcggttgaag actcgcagga ttcgcttcta accactgata gttcagaaat tgtaactctg 540
 ggaggttcaa agcagggaac agaaaatctt cttggagctc tctcaacgcc tgcggttcgt 600
 aaccttgcaa aagaccttgg catagatatc aatgttataa ctggaactgg taaagatggg 660
 agagttttga aagaggatgt tctccggttt agtgaccaga aaggatttgt aacagattca 720
 gtttcttctg agcatgctgt tataggagga gactcgggtt ccactaaagc tagtagtaac 780
 tttgaagata aaacagttcc tctaagggga ttcagccgag caatggtcaa gacaatgact 840
 atggctacaa gtgtaccgca ttttcatttt gttgaagaga taaactgcga ctcaattgtg 900
 gagctcaagc agttcttcaa agagaacaat acagattcca ccatcaaaca cacttttctt 960
 cctactttaa tcaagtctct gtcaatggct ctaaccaa atcccttcgt gaatagttgc 1020
 ttcaacgcgg aatctctcga gatcattctc aaagggtcac ataattattg agttgcaatg 1080
 gccactgaac atggccttgt cgttccta ataaagaatg ttcagtcatt atctctgcta 1140
 gagataacca aagagctgtc ccggttacia catttggcag caaacaacaa acttaacccc 1200
 gaggatgtga ctggtggaac cataactctg agtaacattg gagcaattgg tggtaaattc 1260
 ggatcccttc ttttaaactt accggaagtt gcaatcatcg ttcttgggaag aatcgagaaa 1320
 gttccaaaat tctcaaaaga aggaactgtc ttcctgcat cgataatgat ggttaacatt 1380
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 gagtatgtcg 1450

<210> 16
 <211> 483
 <212> PRT
 <213> Arabidopsis thaliana

<400> 16

Met Ile Ala Arg Arg Ile Trp Arg Ser His Arg Phe Leu Arg Pro Phe
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Ser Ser Ser Ser Val Cys Ser Pro Pro Phe Arg Val Pro Glu Tyr Leu
20 25 30

Ser Gln Ser Ser Ser Ser Pro Ala Ser Arg Pro Phe Phe Val His Pro
35 40 45

Pro Thr Leu Met Lys Trp Gly Gly Gly Ser Arg Ser Trp Phe Ser Asn
50 55 60

Glu Ala Met Ala Thr Asp Ser Asn Ser Gly Leu Ile Asp Val Pro Leu
65 70 75 80

Ala Gln Thr Gly Glu Gly Ile Ala Glu Cys Glu Leu Leu Lys Trp Phe
85 90 95

Val Lys Glu Gly Asp Ser Val Glu Glu Phe Gln Pro Leu Cys Glu Val
100 105 110

Gln Ser Asp Lys Ala Thr Ile Glu Ile Thr Ser Arg Phe Lys Gly Lys
115 120 125

Val Ala Leu Ile Ser His Ser Pro Gly Asp Ile Ile Lys Val Gly Glu
130 135 140

Thr Leu Val Arg Leu Ala Val Glu Asp Ser Gln Asp Ser Leu Leu Thr
145 150 155 160

Thr Asp Ser Ser Glu Ile Val Thr Leu Gly Gly Ser Lys Gln Gly Thr
165 170 175

Glu Asn Leu Leu Gly Ala Leu Ser Thr Pro Ala Val Arg Asn Leu Ala
180 185 190

Lys Asp Leu Gly Ile Asp Ile Asn Val Ile Thr Gly Thr Gly Lys Asp
195 200 205

Gly Arg Val Leu Lys Glu Asp Val Leu Arg Phe Ser Asp Gln Lys Gly
210 215 220

Phe Val Thr Asp Ser Val Ser Ser Glu His Ala Val Ile Gly Gly Asp
225 230 235 240

Ser Val Ser Thr Lys Ala Ser Ser Asn Phe Glu Asp Lys Thr Val Pro
245 250 255

Leu Arg Gly Phe Ser Arg Ala Met Val Lys Thr Met Thr Met Ala Thr
 260 265 270

Ser Val Pro His Phe His Phe Val Glu Glu Ile Asn Cys Asp Ser Leu
 275 280 285

Val Glu Leu Lys Gln Phe Phe Lys Glu Asn Asn Thr Asp Ser Thr Ile
 290 295 300

Lys His Thr Phe Leu Pro Thr Leu Ile Lys Ser Leu Ser Met Ala Leu
 305 310 315 320

Thr Lys Tyr Pro Phe Val Asn Ser Cys Phe Asn Ala Glu Ser Leu Glu
 325 330 335

Ile Ile Leu Lys Gly Ser His Asn Ile Gly Val Ala Met Ala Thr Glu
 340 345 350

His Gly Leu Val Val Pro Asn Ile Lys Asn Val Gln Ser Leu Ser Leu
 355 360 365

Leu Glu Ile Thr Lys Glu Leu Ser Arg Leu Gln His Leu Ala Ala Asn
 370 375 380

Asn Lys Leu Asn Pro Glu Asp Val Thr Gly Gly Thr Ile Thr Leu Ser
 385 390 395 400

Asn Ile Gly Ala Ile Gly Gly Lys Phe Gly Ser Leu Leu Leu Asn Leu
 405 410 415

Pro Glu Val Ala Ile Ile Val Leu Gly Arg Ile Glu Lys Val Pro Lys
 420 425 430

Phe Ser Lys Glu Gly Thr Val Tyr Pro Ala Ser Ile Met Met Val Asn
 435 440 445

Ile Ala Ala Asp His Arg Val Leu Asp Gly Ala Thr Val Ala Arg Phe
 450 455 460

Cys Cys Gln Trp Lys Glu Tyr Val Glu Lys Pro Glu Leu Leu Met Leu
 465 470 475 480

Gln Met Arg

<210> 17

<211> 24

<212> DNA
<213> Arabidopsis thaliana

<400> 17
gggccccata tggcgacggc tttc

24

<210> 18
<211> 26
<212> DNA
<213> Arabidopsis thaliana

<400> 18
ggggcgggcgg ctaataacca cctaac

26

<210> 19
<211> 33
<212> DNA
<213> Arabidopsis thaliana

<400> 19
gggcccgcgg ccgctgatca tttggttcag cag

33

<210> 20
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<212> DNA
<213> Arabidopsis thaliana

<400> 20
gggcccgcgg ccgctgatca tttggttcag cag

33

<210> 21
<211> 30
<212> DNA
<213> Arabidopsis thaliana

<400> 21
gggcccgtcg actcaaakat gaaagccagg

30

<210> 22
<211> 24
<212> DNA
<213> Arabidopsis thaliana

<400> 22

gggccccata tgtcttcgat aatc

24

<210> 23

<211> 27

<212> DNA

<213> Arabidopsis thaliana

<400> 23

gggcccctcg agaccttcct gaagagc

27

<210> 24

<211> 27

<212> DNA

<213> Arabidopsis thaliana

<400> 24

gggcccctcg agaccttcct gaagagc

27

<210> 25

<211> 33

<212> DNA

<213> Arabidopsis thaliana

<400> 25

gggcccgaat tctcattact agtaattcac agt

33

<210> 26

<211> 24

<212> DNA

<213> Arabidopsis thaliana

<400> 26

gggccccata tggcggtttc ttct

24

<210> 27

<211> 28

<212> DNA

<213> Arabidopsis thaliana

<400> 27

gggcccccat ggcaatttca ggattcctt

28

<210> 28
<211> 24
<212> DNA
<213> Arabidopsis thaliana

<400> 28
gggccccata tgtcttcgat aatc

24

<210> 29
<211> 26
<212> DNA
<213> Arabidopsis thaliana

<400> 29
gggcccccat ggcgacggct ttcgct

26

<210> 30
<211> 31
<212> DNA
<213> Arabidopsis thaliana

<400> 30
gggccctgat catattattg gtggattgct t

31

<210> 31
<211> 27
<212> DNA
<213> Arabidopsis thaliana

<400> 31
gggccctcg agatcgcttt ggacacc

27

<210> 32
<211> 32
<212> DNA
<213> Arabidopsis thaliana

<400> 32
gggcccgcg cgcattatt ggtggattgc tt

32

<210> 33
<211> 428

<212> PRT

<213> Arabidopsis thaliana

<400> 33

Met Ala Thr Ala Phe Ala Pro Thr Lys Leu Thr Ala Thr Val Pro Leu
1 5 10 15

His Gly Ser His Glu Asn Arg Leu Leu Leu Pro Ile Arg Leu Ala Pro
20 25 30

Pro Ser Ser Phe Leu Gly Ser Thr Arg Ser Leu Ser Leu Arg Arg Leu
35 40 45

Asn His Ser Asn Ala Thr Arg Arg Ser Pro Val Val Ser Val Gln Glu
50 55 60

Val Val Lys Glu Lys Gln Ser Thr Asn Asn Thr Ser Leu Leu Ile Thr
65 70 75 80

Lys Glu Glu Gly Leu Glu Leu Tyr Glu Asp Met Ile Leu Gly Arg Ser
85 90 95

Phe Glu Asp Met Cys Ala Gln Met Tyr Tyr Arg Gly Lys Met Phe Gly
100 105 110

Phe Val His Leu Tyr Asn Gly Gln Glu Ala Val Ser Thr Gly Phe Ile
115 120 125

Lys Leu Leu Thr Lys Ser Asp Ser Val Val Ser Thr Tyr Arg Asp His
130 135 140

Val His Ala Leu Ser Lys Gly Val Ser Ala Arg Ala Val Met Ser Glu
145 150 155 160

Leu Phe Gly Lys Val Thr Gly Cys Cys Arg Gly Gln Gly Gly Ser Met
165 170 175

His Met Phe Ser Lys Glu His Asn Met Leu Gly Gly Phe Ala Phe Ile
180 185 190

Gly Glu Gly Ile Pro Val Ala Thr Gly Ala Ala Phe Ser Ser Lys Tyr
195 200 205

Arg Arg Glu Val Leu Lys Gln Asp Cys Asp Asp Val Thr Val Ala Phe
210 215 220

Phe Gly Asp Gly Thr Cys Asn Asn Gly Gln Phe Phe Glu Cys Leu Asn
225 230 235 240

Met Ala Ala Leu Tyr Lys Leu Pro Ile Ile Phe Val Val Glu Asn Asn
245 250 255

Leu Trp Ala Ile Gly Met Ser His Leu Arg Ala Thr Ser Asp Pro Glu
260 265 270

Ile Trp Lys Lys Gly Pro Ala Phe Gly Met Pro Gly Val His Val Asp
275 280 285

Gly Met Asp Val Leu Lys Val Arg Glu Val Ala Lys Glu Ala Val Thr
290 295 300

Arg Ala Arg Arg Gly Glu Gly Pro Thr Leu Val Glu Cys Glu Thr Tyr
305 310 315 320

Arg Phe Arg Gly His Ser Leu Ala Asp Pro Asp Glu Leu Arg Asp Ala
325 330 335

Ala Glu Lys Ala Lys Tyr Ala Ala Arg Asp Pro Ile Ala Ala Leu Lys
340 345 350

Lys Tyr Leu Ile Glu Asn Lys Leu Ala Lys Glu Ala Glu Leu Lys Ser
355 360 365

Ile Glu Lys Lys Ile Asp Glu Leu Val Glu Glu Ala Val Glu Phe Ala
370 375 380

Asp Ala Ser Pro Gln Pro Gly Arg Ser Gln Leu Leu Glu Asn Val Phe
385 390 395 400

Ala Asp Pro Lys Gly Phe Gly Ile Gly Pro Asp Gly Arg Tyr Arg Cys
405 410 415

Glu Asp Pro Lys Phe Thr Glu Gly Thr Ala Gln Val
420 425

<210> 34

<211> 344

<212> PRT

<213> P. purpurea

<400> 34

Met Ser Tyr Pro Lys Lys Val Glu Leu Pro Leu Thr Asn Cys Asn Gln
1 5 10 15

Ile Asn Leu Thr Lys His Lys Leu Leu Val Leu Tyr Glu Asp Met Leu

20

25

30

Leu Gly Arg Asn Phe Glu Asp Met Cys Ala Gln Met Tyr Tyr Lys Gly
 35 40 45

Lys Met Phe Gly Phe Val His Leu Tyr Asn Gly Gln Glu Ala Val Ser
 50 55 60

Thr Gly Val Ile Lys Leu Leu Asp Ser Lys Asp Tyr Val Cys Ser Thr
 65 70 75 80

Tyr Arg Asp His Val His Ala Leu Ser Lys Gly Val Pro Ser Gln Asn
 85 90 95

Val Met Ala Glu Leu Phe Gly Lys Glu Thr Gly Cys Ser Arg Gly Arg
 100 105 110

Gly Gly Ser Met His Ile Phe Ser Ala Pro His Asn Phe Leu Gly Gly
 115 120 125

Phe Ala Phe Ile Ala Glu Gly Ile Pro Val Ala Thr Gly Ala Ala Phe
 130 135 140

Gln Ser Ile Tyr Arg Gln Gln Val Leu Lys Glu Pro Gly Glu Leu Arg
 145 150 155 160

Val Thr Ala Cys Phe Phe Gly Asp Gly Thr Thr Asn Asn Gly Gln Phe
 165 170 175

Phe Glu Cys Leu Asn Met Ala Val Leu Trp Lys Leu Pro Ile Ile Phe
 180 185 190

Val Val Glu Asn Asn Gln Trp Ala Ile Gly Met Ala His His Arg Ser
 195 200 205

Ser Ser Ile Pro Glu Ile His Lys Lys Ala Glu Ala Phe Gly Leu Pro
 210 215 220

Gly Ile Glu Val Asp Gly Met Asp Val Leu Ala Val Arg Gln Val Ala
 225 230 235 240

Glu Lys Ala Val Glu Arg Ala Arg Gln Gly Gln Gly Pro Thr Leu Ile
 245 250 255

Glu Ala Leu Thr Tyr Arg Phe Arg Gly His Ser Leu Ala Asp Pro Asp
 260 265 270

Glu Leu Arg Ser Arg Gln Glu Lys Glu Ala Trp Val Ala Arg Asp Pro

275 280 285
 Ile Lys Lys Leu Lys Lys His Ile Leu Asp Asn Gln Ile Ala Ser Ser
 290 295 300
 Asp Glu Leu Asn Asp Ile Gln Ser Ser Val Lys Ile Asp Leu Glu Gln
 305 310 315 320
 Ser Val Glu Phe Ala Met Ser Ser Pro Glu Pro Asn Ile Ser Glu Leu
 325 330 335
 Lys Arg Tyr Leu Phe Ala Asp Asn
 340

<210> 35
 <211> 389
 <212> PRT
 <213> Arabidopsis thaliana

<400> 35
 Met Ala Leu Ser Arg Leu Ser Ser Arg Ser Asn Ile Ile Thr Arg Pro
 1 5 10 15
 Phe Ser Ala Ala Phe Ser Arg Leu Ile Ser Thr Asp Thr Thr Pro Ile
 20 25 30
 Thr Ile Glu Thr Ser Leu Pro Phe Thr Ala His Leu Cys Asp Pro Pro
 35 40 45
 Ser Arg Ser Val Glu Ser Ser Ser Gln Glu Leu Leu Asp Phe Phe Arg
 50 55 60
 Thr Met Ala Leu Met Arg Arg Met Glu Ile Ala Ala Asp Ser Leu Tyr
 65 70 75 80
 Lys Ala Asn Val Ile Arg Gly Phe Cys His Leu Tyr Asp Gly Gln Glu
 85 90 95
 Ala Val Ala Ile Gly Met Glu Ala Ala Ile Thr Lys Lys Asp Ala Ile
 100 105 110
 Ile Thr Ala Tyr Arg Asp His Cys Ile Phe Leu Gly Arg Gly Gly Ser
 115 120 125
 Leu His Glu Val Phe Ser Glu Leu Met Gly Arg Gln Ala Gly Cys Ser
 130 135 140

Lys Gly Lys Gly Gly Ser Met His Phe Tyr Lys Lys Glu Ser Ser Phe
 145 150 155 160

Tyr Gly Gly His Gly Ile Val Gly Ala Gln Val Pro Leu Gly Cys Gly
 165 170 175

Ile Ala Phe Ala Gln Lys Tyr Asn Lys Glu Glu Ala Val Thr Phe Ala
 180 185 190

Leu Tyr Gly Asp Gly Ala Ala Asn Gln Gly Gln Leu Phe Glu Ala Leu
 195 200 205

Asn Ile Ser Ala Leu Trp Asp Leu Pro Ala Ile Leu Val Cys Glu Asn
 210 215 220

Asn His Tyr Gly Met Gly Thr Ala Glu Trp Arg Ala Ala Lys Ser Pro
 225 230 235 240

Ser Tyr Tyr Lys Arg Gly Asp Tyr Val Pro Gly Leu Lys Val Asp Gly
 245 250 255

Met Asp Ala Phe Ala Val Lys Gln Ala Cys Lys Phe Ala Lys Gln His
 260 265 270

Ala Leu Glu Lys Gly Pro Ile Ile Leu Glu Met Asp Thr Tyr Arg Tyr
 275 280 285

His Gly His Ser Met Ser Asp Pro Gly Ser Thr Tyr Arg Thr Arg Asp
 290 295 300

Glu Ile Ser Gly Val Arg Gln Glu Arg Asp Pro Ile Glu Arg Ile Lys
 305 310 315 320

Lys Leu Val Leu Ser His Asp Leu Ala Thr Glu Lys Glu Leu Lys Asp
 325 330 335

Met Glu Lys Glu Ile Arg Lys Glu Val Asp Asp Ala Ile Ala Lys Ala
 340 345 350

Lys Asp Cys Pro Met Pro Glu Pro Ser Glu Leu Phe Thr Asn Val Tyr
 355 360 365

Val Lys Gly Phe Gly Thr Glu Ser Phe Gly Pro Asp Arg Lys Glu Val
 370 375 380

Lys Ala Ser Leu Pro
 385

<210> 36

<211> 390

<212> PRT

<213> H. sapiens II

<400> 36

Met Arg Lys Met Leu Ala Ala Val Ser Arg Val Leu Ser Gly Ala Ser
1 5 10 15

Gln Lys Pro Ala Ser Arg Val Leu Val Ala Ser Arg Asn Phe Ala Asn
20 25 30

Asp Ala Thr Phe Glu Ile Lys Lys Cys Asp Leu His Arg Leu Glu Glu
35 40 45

Gly Pro Pro Val Thr Thr Val Leu Thr Arg Glu Asp Gly Leu Lys Tyr
50 55 60

Tyr Arg Met Met Gln Thr Val Arg Arg Met Glu Leu Lys Ala Asp Gln
65 70 75 80

Leu Tyr Lys Gln Lys Ile Ile Arg Gly Phe Cys His Leu Cys Asp Gly
85 90 95

Gln Glu Ala Cys Cys Val Gly Leu Glu Ala Gly Ile Asn Pro Thr Asp
100 105 110

His Leu Ile Thr Ala Tyr Arg Ala His Gly Phe Thr Phe Thr Arg Gly
115 120 125

Leu Ser Val Arg Glu Ile Leu Ala Glu Leu Thr Gly Arg Lys Gly Gly
130 135 140

Cys Ala Lys Gly Lys Gly Gly Ser Met His Met Tyr Ala Lys Asn Phe
145 150 155 160

Tyr Gly Gly Asn Gly Ile Val Gly Ala Gln Val Pro Leu Gly Ala Gly
165 170 175

Ile Ala Leu Ala Cys Lys Tyr Asn Gly Lys Asp Glu Val Cys Leu Thr
180 185 190

Leu Tyr Gly Asp Gly Ala Ala Asn Gln Gly Gln Ile Phe Glu Ala Tyr
195 200 205

Asn Met Ala Ala Leu Trp Lys Leu Pro Cys Ile Phe Ile Cys Glu Asn
210 215 220

Asn Arg Tyr Gly Met Gly Thr Ser Val Glu Arg Ala Ala Ala Ser Thr
225 230 235 240

Asp Tyr Tyr Lys Arg Gly Asp Phe Ile Pro Gly Leu Arg Val Asp Gly
245 250 255

Met Asp Ile Leu Cys Val Arg Glu Ala Thr Arg Phe Ala Ala Ala Tyr
260 265 270

Cys Arg Ser Gly Lys Gly Pro Ile Leu Met Glu Leu Gln Thr Tyr Arg
275 280 285

Tyr His Gly His Ser Met Ser Asp Pro Gly Val Ser Tyr Arg Thr Arg
290 295 300

Glu Glu Ile Gln Glu Val Arg Ser Lys Ser Asp Pro Ile Met Leu Leu
305 310 315 320

Lys Asp Arg Met Val Asn Ser Asn Leu Ala Ser Val Glu Glu Leu Lys
325 330 335

Glu Ile Asp Val Glu Val Arg Lys Glu Ile Glu Asp Ala Ala Gln Phe
340 345 350

Ala Thr Ala Asp Pro Glu Pro Pro Leu Glu Glu Leu Gly Tyr His Ile
355 360 365

Tyr Ser Ser Asp Pro Pro Phe Glu Val Arg Gly Ala Asn Gln Trp Ile
370 375 380

Lys Phe Lys Ser Val Ser
385 390

<210> 37

<211> 420

<212> PRT

<213> *S. cerevisiae*

<400> 37

Met Leu Ala Ala Ser Phe Lys Arg Gln Pro Ser Gln Leu Val Arg Gly
1 5 10 15

Leu Gly Ala Val Leu Arg Thr Pro Thr Arg Ile Gly His Val Arg Thr
20 25 30

Met Ala Thr Leu Lys Thr Thr Asp Lys Lys Ala Pro Glu Asp Ile Glu

35

40

45

Gly Ser Asp Thr Val Gln Ile Glu Leu Pro Glu Ser Ser Phe Glu Ser
50 55 60

Tyr Met Leu Glu Pro Pro Asp Leu Ser Tyr Glu Thr Ser Lys Ala Thr
65 70 75 80

Leu Leu Gln Met Tyr Lys Asp Met Val Ile Ile Arg Arg Met Glu Met
85 90 95

Ala Cys Asp Ala Leu Tyr Lys Ala Lys Lys Ile Arg Gly Phe Cys His
100 105 110

Leu Ser Val Gly Gln Glu Ala Ile Ala Val Gly Ile Glu Asn Ala Ile
115 120 125

Thr Lys Leu Asp Ser Ile Ile Thr Ser Tyr Arg Cys His Gly Phe Thr
130 135 140

Phe Met Arg Gly Ala Ser Val Lys Ala Val Leu Ala Glu Leu Met Gly
145 150 155 160

Arg Arg Ala Gly Val Ser Tyr Gly Lys Gly Gly Ser Met His Leu Tyr
165 170 175

Ala Pro Gly Phe Tyr Gly Gly Asn Gly Ile Val Gly Ala Gln Val Pro
180 185 190

Leu Gly Ala Gly Leu Ala Phe Ala His Gln Tyr Lys Asn Glu Asp Ala
195 200 205

Cys Ser Phe Thr Leu Tyr Gly Asp Gly Ala Ser Asn Gln Gly Gln Val
210 215 220

Phe Glu Ser Phe Asn Met Ala Lys Leu Trp Asn Leu Pro Val Val Phe
225 230 235 240

Cys Cys Glu Asn Asn Lys Tyr Gly Met Gly Thr Ala Ala Ser Arg Ser
245 250 255

Ser Ala Met Thr Glu Tyr Phe Lys Arg Gly Gln Tyr Ile Pro Gly Leu
260 265 270

Lys Val Asn Gly Met Asp Ile Leu Ala Val Tyr Gln Ala Ser Lys Phe
275 280 285

Ala Lys Asp Trp Cys Leu Ser Gly Lys Gly Pro Leu Val Leu Glu Tyr

290

295

300

Glu Thr Tyr Arg Tyr Gly Gly His Ser Met Ser Asp Pro Gly Thr Thr
305 310 315 320

Tyr Arg Thr Arg Asp Glu Ile Gln His Met Arg Ser Lys Asn Asp Pro
325 330 335

Ile Ala Gly Leu Lys Met His Leu Ile Asp Leu Gly Ile Ala Thr Glu
340 345 350

Ala Glu Val Lys Ala Tyr Asp Lys Ser Ala Arg Lys Tyr Val Asp Glu
355 360 365

Gln Val Glu Leu Ala Asp Ala Ala Pro Pro Pro Glu Ala Lys Leu Ser
370 375 380

Ile Leu Phe Glu Asp Val Tyr Val Lys Gly Thr Glu Thr Pro Thr Leu
385 390 395 400

Arg Gly Arg Ile Pro Glu Asp Thr Trp Asp Phe Lys Lys Gln Gly Phe
405 410 415

Ala Ser Arg Asp
420

<210> 38

<211> 396

<212> PRT

<213> A. suum I

<400> 38

Met Ile Phe Val Phe Ala Asn Ile Phe Lys Val Pro Thr Val Ser Pro
1 5 10 15

Ser Val Met Ala Ile Ser Val Arg Leu Ala Ser Thr Glu Ala Thr Phe
20 25 30

Gln Thr Lys Pro Phe Lys Leu His Lys Leu Asp Ser Gly Pro Asp Ile
35 40 45

Asn Val His Val Thr Lys Glu Asp Ala Val His Tyr Tyr Thr Gln Met
50 55 60

Leu Thr Ile Arg Arg Met Glu Ser Ala Ala Gly Asn Leu Tyr Lys Glu
65 70 75 80

Lys Lys Val Arg Gly Phe Cys His Leu Tyr Ser Gly Gln Glu Ala Cys
85 90 95

Ala Val Gly Thr Lys Ala Ala Met Asp Ala Gly Asp Ala Ala Val Thr
100 105 110

Ala Tyr Arg Cys His Gly Trp Thr Tyr Leu Ser Gly Ser Ser Val Ala
115 120 125

Lys Val Leu Cys Glu Leu Thr Gly Arg Ile Thr Gly Asn Val Tyr Gly
130 135 140

Lys Gly Gly Ser Met His Met Tyr Gly Glu Asn Phe Tyr Gly Gly Asn
145 150 155 160

Gly Ile Val Gly Ala Gln Gln Pro Leu Gly Thr Gly Ile Ala Phe Ala
165 170 175

Met Lys Tyr Arg Lys Glu Lys Asn Val Cys Ile Thr Met Phe Gly Asp
180 185 190

Gly Ala Thr Asn Gln Gly Gln Leu Phe Glu Ser Met Asn Met Ala Lys
195 200 205

Leu Trp Asp Leu Pro Val Leu Tyr Val Cys Glu Asn Asn Gly Tyr Gly
210 215 220

Met Gly Thr Ala Ala Ala Arg Ser Ser Ala Ser Thr Asp Tyr Tyr Thr
225 230 235 240

Arg Gly Asp Tyr Val Pro Gly Ile Trp Val Asp Gly Met Asp Val Leu
245 250 255

Ala Val Arg Gln Ala Val Arg Trp Ala Lys Glu Trp Cys Asn Ala Gly
260 265 270

Lys Gly Pro Leu Met Ile Glu Met Ala Thr Tyr Arg Tyr Ser Gly His
275 280 285

Ser Met Ser Asp Pro Gly Thr Ser Tyr Arg Thr Arg Glu Glu Val Gln
290 295 300

Glu Val Arg Lys Thr Arg Asp Pro Ile Thr Gly Phe Lys Asp Lys Ile
305 310 315 320

Val Thr Ala Gly Leu Val Thr Glu Asp Glu Ile Lys Glu Ile Asp Lys
325 330 335

Gln Val Arg Lys Glu Ile Asp Ala Ala Val Lys Gln Ala His Thr Asp
340 345 350

Lys Glu Ser Pro Val Glu Leu Met Leu Thr Asp Ile Tyr Tyr Asn Thr
355 360 365

Pro Ala Gln Tyr Val Arg Cys Thr Thr Asp Glu Val Leu Gln Lys Tyr
370 375 380

Leu Thr Ser Glu Glu Ala Val Lys Ala Leu Ala Lys
385 390 395

<210> 39

<211> 370

<212> PRT

<213> M. capricolum

<400> 39

Met Thr Tyr Leu Gly Lys Phe Asp Pro Leu Lys Asn Glu Lys Val Cys
1 5 10 15

Val Leu Asp Lys Asp Gly Lys Val Ile Asn Pro Lys Leu Met Pro Lys
20 25 30

Ile Ser Asp Gln Glu Ile Leu Glu Ala Tyr Lys Ile Met Asn Leu Ser
35 40 45

Arg Arg Gln Asp Ile Tyr Gln Asn Thr Met Gln Arg Gln Gly Arg Leu
50 55 60

Leu Ser Phe Leu Ser Ser Thr Gly Gln Glu Ala Cys Glu Val Ala Tyr
65 70 75 80

Ile Asn Ala Leu Asn Lys Lys Thr Asp His Phe Val Ser Gly Tyr Arg
85 90 95

Asn Asn Ala Ala Trp Leu Ala Met Gly Gln Leu Val Arg Asn Ile Met
100 105 110

Leu Tyr Trp Ile Gly Asn Glu Ala Gly Gly Lys Ala Pro Glu Gly Val
115 120 125

Asn Cys Leu Pro Pro Asn Ile Val Ile Gly Ser Gln Tyr Ser Gln Ala
130 135 140

Thr Gly Ile Ala Phe Ala Asp Lys Tyr Arg Lys Thr Gly Gly Val Val
145 150 155 160

Val Thr Thr Thr Gly Asp Gly Gly Ser Ser Glu Gly Glu Thr Tyr Glu
165 170 175

Ala Met Asn Phe Ala Lys Leu His Glu Val Pro Cys Ile Phe Val Ile
180 185 190

Glu Asn Asn Lys Trp Ala Ile Ser Thr Ala Arg Ser Glu Gln Thr Lys
195 200 205

Ser Ile Asn Phe Ala Val Lys Gly Ile Ala Thr Gly Ile Pro Ser Ile
210 215 220

Ile Val Asp Gly Asn Asp Tyr Leu Ala Cys Ile Gly Val Phe Lys Glu
225 230 235 240

Val Val Glu Tyr Val Arg Lys Gly Asn Gly Pro Val Leu Val Glu Cys
245 250 255

Asp Thr Tyr Arg Leu Gly Ala His Ser Ser Ser Asp Asn Pro Asp Ala
260 265 270

Tyr Arg Pro Lys Gly Glu Phe Glu Glu Met Ala Lys Phe Asp Pro Leu
275 280 285

Ile Arg Leu Lys Gln Tyr Leu Ile Asp Lys Lys Ile Trp Ser Asp Glu
290 295 300

Gln Gln Ala Gln Leu Glu Ala Glu Gln Asp Lys Phe Val Ala Asp Glu
305 310 315 320

Phe Ala Trp Val Glu Lys Asn Lys Asn Tyr Asp Leu Ile Asp Ile Phe
325 330 335

Lys Tyr Gln Tyr Asp Lys Met Asp Ile Phe Leu Glu Glu Gln Tyr Lys
340 345 350

Glu Ala Lys Glu Phe Phe Glu Lys Tyr Pro Glu Ser Lys Glu Gly Gly
355 360 365

His His
370

<210> 40

<211> 369

<212> PRT

<213> B. subtilis

<400> 40

Met Gly Val Lys Thr Phe Gln Phe Pro Phe Ala Glu Gln Leu Glu Lys
1 5 10 15

Val Ala Glu Gln Phe Pro Thr Phe Gln Ile Leu Asn Glu Glu Gly Glu
20 25 30

Val Val Asn Glu Glu Ala Met Pro Glu Leu Ser Asp Glu Gln Leu Lys
35 40 45

Glu Leu Met Arg Arg Met Val Tyr Thr Arg Ile Leu Asp Gln Arg Ser
50 55 60

Ile Ser Leu Asn Arg Gln Gly Arg Leu Gly Phe Tyr Ala Pro Thr Ala
65 70 75 80

Gly Gln Glu Ala Ser Gln Ile Ala Ser His Phe Ala Leu Glu Lys Glu
85 90 95

Asp Phe Ile Leu Pro Gly Tyr Arg Asp Val Pro Gln Ile Ile Trp His
100 105 110

Gly Leu Pro Leu Tyr Gln Ala Phe Leu Phe Ser Arg Gly His Phe His
115 120 125

Gly Asn Gln Ile Pro Glu Gly Val Asn Val Leu Pro Pro Gln Ile Ile
130 135 140

Ile Gly Ala Gln Tyr Ile Gln Ala Ala Gly Val Ala Leu Gly Leu Lys
145 150 155 160

Met Arg Gly Lys Lys Ala Val Ala Ile Thr Tyr Thr Gly Asp Gly Gly
165 170 175

Thr Ser Gln Gly Asp Phe Tyr Glu Gly Ile Asn Phe Ala Gly Ala Phe
180 185 190

Lys Ala Pro Ala Ile Phe Val Val Gln Asn Asn Arg Phe Ala Ile Ser
195 200 205

Thr Pro Val Glu Lys Gln Thr Val Ala Lys Thr Leu Ala Gln Lys Ala
210 215 220

Val Ala Ala Gly Ile Pro Gly Ile Gln Val Asp Gly Met Asp Pro Leu
225 230 235 240

Ala Val Tyr Ala Ala Val Lys Ala Ala Arg Glu Arg Ala Ile Asn Gly

245

250

255

Glu Gly Pro Thr Leu Ile Glu Thr Leu Cys Phe Arg Tyr Gly Pro His
260 265 270

Thr Met Ser Gly Asp Asp Pro Thr Arg Tyr Arg Ser Lys Glu Leu Glu
275 280 285

Asn Glu Trp Ala Lys Lys Asp Pro Leu Val Arg Phe Arg Lys Phe Leu
290 295 300

Glu Ala Lys Gly Leu Trp Ser Glu Glu Glu Glu Asn Asn Val Ile Glu
305 310 315 320

Gln Ala Lys Glu Glu Ile Lys Glu Ala Ile Lys Lys Ala Asp Glu Thr
325 330 335

Pro Lys Gln Lys Val Thr Asp Leu Ile Ser Ile Met Phe Glu Glu Leu
340 345 350

Pro Phe Asn Leu Lys Glu Gln Tyr Glu Ile Tyr Lys Glu Lys Glu Ser
355 360 365

Lys

<210> 41

<211> 129

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Consensus

<400> 41

Leu Tyr Met Arg Arg Glu Leu Tyr Gly Phe His Leu Gly Gln Glu Ala
1 5 10 15

Gly Lys Asp Tyr Arg His Gly Ser Val Glu Leu Gly Gly Gly Gly Gly
20 25 30

Ser Met His Phe Gly Gly Ile Gly Ala Gln Pro Gly Ala Phe Ala Lys
35 40 45

Tyr Arg Val Thr Gly Asp Gly Asn Gln Gly Gln Phe Glu Asn Met Ala
50 55 60

Leu Trp Leu Pro Ile Phe Val Glu Asn Asn Gly Thr Ala Arg Lys Gly
65 70 75 80

Pro Gly Val Asp Gly Met Asp Leu Ala Val Ala Lys Ala Gly Gly Pro
85 90 95

Leu Glu Thr Tyr Arg Tyr Gly His Ser Met Ser Asp Pro Tyr Arg Arg
100 105 110

Glu Asp Pro Ile Leu Lys Leu Ala Glu Glu Lys Lys Ala Ala Pro Pro
115 120 125

Leu

<210> 42

<211> 406

<212> PRT

<213> Arabidopsis thaliana

<400> 42

Met Ser Ser Ile Ile His Gly Ala Gly Ala Ala Thr Thr Thr Leu Ser
1 5 10 15

Thr Phe Asn Ser Val Asp Ser Lys Lys Leu Phe Val Ala Pro Ser Arg
20 25 30

Thr Asn Leu Ser Val Arg Ser Gln Arg Tyr Ile Val Ala Gly Ser Asp
35 40 45

Ala Ser Lys Lys Ser Phe Gly Ser Gly Leu Arg Val Arg His Ser Gln
50 55 60

Lys Leu Ile Pro Asn Ala Val Ala Thr Lys Glu Ala Asp Thr Ser Ala
65 70 75 80

Ser Thr Gly His Glu Leu Leu Leu Phe Glu Ala Leu Gln Glu Gly Leu
85 90 95

Glu Glu Glu Met Asp Arg Asp Pro His Val Cys Val Met Gly Glu Asp
100 105 110

Val Gly His Tyr Gly Gly Ser Tyr Lys Val Thr Lys Gly Leu Ala Asp
115 120 125

Lys Phe Gly Asp Leu Arg Val Leu Asp Thr Pro Ile Cys Glu Asn Ala
130 135 140

Phe Thr Gly Met Gly Ile Gly Ala Ala Met Thr Gly Leu Arg Pro Val
145 150 155 160

Ile Glu Gly Met Asn Met Gly Phe Leu Leu Leu Ala Phe Asn Gln Ile
165 170 175

Ser Asn Asn Cys Gly Met Leu His Tyr Thr Ser Gly Gly Gln Phe Thr
180 185 190

Ile Pro Val Val Ile Arg Gly Pro Gly Gly Val Gly Arg Gln Leu Gly
195 200 205

Ala Glu His Ser Gln Arg Leu Glu Ser Tyr Phe Gln Ser Ile Pro Gly
210 215 220

Ile Gln Met Val Ala Cys Ser Thr Pro Tyr Asn Ala Lys Gly Leu Met
225 230 235 240

Lys Ala Ala Ile Arg Ser Glu Asn Pro Val Ile Leu Phe Glu His Val
245 250 255

Leu Leu Tyr Asn Leu Lys Glu Lys Ile Pro Asp Glu Asp Tyr Ile Cys
260 265 270

Asn Leu Glu Glu Ala Glu Met Val Arg Pro Gly Glu His Ile Thr Ile
275 280 285

Leu Thr Tyr Ser Arg Met Arg Tyr His Val Met Gln Ala Ala Lys Thr
290 295 300

Leu Val Asn Lys Gly Tyr Asp Pro Glu Val Ile Asp Ile Arg Ser Leu
305 310 315 320

Lys Pro Phe Asp Leu His Thr Ile Gly Asn Ser Val Lys Lys Thr His
325 330 335

Arg Val Leu Ile Val Glu Glu Cys Met Arg Thr Gly Gly Ile Gly Ala
340 345 350

Ser Leu Thr Ala Ala Ile Asn Glu Asn Phe His Asp Tyr Leu Asp Ala
355 360 365

Pro Val Met Cys Leu Ser Ser Gln Asp Val Pro Thr Pro Tyr Ala Gly
370 375 380

Thr Leu Glu Glu Trp Thr Val Val Gln Pro Ala Gln Ile Val Thr Ala
385 390 395 400

Val Glu Gln Leu Cys Gln

405

<210> 43

<211> 331

<212> PRT

<213> P. purpurea

<400> 43

Met Ser Lys Val Phe Met Phe Asp Ala Leu Arg Ala Ala Thr Asp Glu

1

5

10

15

Glu Met Glu Lys Asp Leu Thr Val Cys Val Ile Gly Glu Asp Val Gly

20

25

30

His Tyr Gly Gly Ser Tyr Lys Val Thr Lys Asp Leu His Ser Lys Tyr

35

40

45

Gly Asp Leu Arg Val Leu Asp Thr Pro Ile Ala Glu Asn Ser Phe Thr

50

55

60

Gly Met Ala Ile Gly Ala Ala Ile Thr Gly Leu Arg Pro Ile Val Glu

65

70

75

80

Gly Met Asn Met Ser Phe Leu Leu Leu Ala Phe Asn Gln Ile Ser Asn

85

90

95

Asn Ala Gly Met Leu Arg Tyr Thr Ser Gly Gly Asn Phe Thr Leu Pro

100

105

110

Leu Val Ile Arg Gly Pro Gly Gly Val Gly Arg Gln Leu Gly Ala Glu

115

120

125

His Ser Gln Arg Leu Glu Ala Tyr Phe Gln Ala Ile Pro Gly Leu Lys

130

135

140

Ile Val Ala Cys Ser Thr Pro Tyr Asn Ala Lys Gly Leu Leu Lys Ser

145

150

155

160

Ala Ile Arg Asp Asn Asn Pro Val Val Phe Phe Glu His Val Leu Leu

165

170

175

Tyr Asn Leu Gln Glu Glu Ile Pro Glu Asp Glu Tyr Leu Ile Pro Leu

180

185

190

Asp Lys Ala Glu Val Val Arg Lys Gly Lys Asp Ile Thr Ile Leu Thr

195

200

205

Tyr Ser Arg Met Arg His His Val Thr Glu Ala Leu Pro Leu Leu Leu
210 215 220

Asn Asp Gly Tyr Asp Pro Glu Val Leu Asp Leu Ile Ser Leu Lys Pro
225 230 235 240

Leu Asp Ile Asp Ser Ile Ser Val Ser Val Lys Lys Thr His Arg Val
245 250 255

Leu Ile Val Glu Glu Cys Met Lys Thr Ala Gly Ile Gly Ala Glu Leu
260 265 270

Ile Ala Gln Ile Asn Glu His Leu Phe Asp Glu Leu Asp Ala Pro Val
275 280 285

Val Arg Leu Ser Ser Gln Asp Ile Pro Thr Pro Tyr Asn Gly Ser Leu
290 295 300

Glu Gln Ala Thr Val Ile Gln Pro His Gln Ile Ile Asp Ala Val Lys
305 310 315 320

Asn Ile Val Asn Ser Ser Lys Thr Ile Thr Thr
325 330

<210> 44

<211> 363

<212> PRT

<213> Arabidopsis thaliana

<400> 44

Met Leu Gly Ile Leu Arg Gln Arg Ala Ile Asp Gly Ala Ser Thr Leu
1 5 10 15

Arg Arg Thr Arg Phe Ala Leu Val Ser Ala Arg Ser Tyr Ala Ala Gly
20 25 30

Ala Lys Glu Met Thr Val Arg Asp Ala Leu Asn Ser Ala Ile Asp Glu
35 40 45

Glu Met Ser Ala Asp Pro Lys Val Phe Val Met Gly Glu Glu Val Gly
50 55 60

Gln Tyr Gln Gly Ala Tyr Lys Ile Thr Lys Gly Leu Leu Glu Lys Tyr
65 70 75 80

Gly Pro Glu Arg Val Tyr Asp Thr Pro Ile Thr Glu Ala Gly Phe Thr
85 90 95

Gly Ile Gly Val Gly Ala Ala Tyr Ala Gly Leu Lys Pro Val Val Glu
100 105 110

Phe Met Thr Phe Asn Phe Ser Met Gln Ala Ile Asp His Ile Ile Asn
115 120 125

Ser Ala Ala Lys Ser Asn Tyr Met Ser Ala Gly Gln Ile Asn Val Pro
130 135 140

Ile Val Phe Arg Gly Pro Asn Gly Ala Ala Ala Gly Val Gly Ala Gln
145 150 155 160

His Ser Gln Cys Tyr Ala Ala Trp Tyr Ala Ser Val Pro Gly Leu Lys
165 170 175

Val Leu Ala Pro Tyr Ser Ala Glu Asp Ala Arg Gly Leu Leu Lys Ala
180 185 190

Ala Ile Arg Asp Pro Asp Pro Val Val Phe Leu Glu Asn Glu Leu Leu
195 200 205

Tyr Gly Glu Ser Phe Pro Ile Ser Glu Glu Ala Leu Asp Ser Ser Phe
210 215 220

Cys Leu Pro Ile Gly Lys Ala Lys Ile Glu Arg Glu Gly Lys Asp Val
225 230 235 240

Thr Ile Val Thr Phe Ser Lys Met Val Gly Phe Ala Leu Lys Ala Ala
245 250 255

Glu Lys Leu Ala Glu Glu Gly Ile Ser Ala Glu Val Ile Asn Leu Arg
260 265 270

Ser Ile Arg Pro Leu Asp Arg Ala Thr Ile Asn Ala Ser Val Arg Lys
275 280 285

Thr Ser Arg Leu Val Thr Val Glu Glu Gly Phe Pro Gln His Gly Val
290 295 300

Cys Ala Glu Ile Cys Ala Ser Val Val Glu Glu Ser Phe Ser Tyr Leu
305 310 315 320

Asp Ala Pro Val Glu Arg Ile Ala Gly Ala Asp Val Pro Ile Pro Tyr
325 330 335

Thr Ala Asn Leu Glu Arg Leu Ala Leu Pro Gln Ile Glu Asp Ile Val
340 345 350

Arg Ala Ser Lys Arg Ala Cys Tyr Arg Ser Lys
355 360

<210> 45
<211> 359
<212> PRT
<213> H. sapiens

<400> 45
Met Ala Ala Val Ser Gly Leu Val Arg Arg Pro Leu Arg Glu Val Ser
1 5 10 15

Gly Leu Leu Lys Arg Arg Phe His Trp Thr Ala Pro Ala Ala Leu Gln
20 25 30

Val Thr Val Arg Asp Ala Ile Asn Gln Gly Met Asp Glu Glu Leu Glu
35 40 45

Arg Asp Glu Lys Val Phe Leu Leu Gly Glu Glu Val Ala Gln Tyr Asp
50 55 60

Gly Ala Tyr Lys Val Ser Arg Gly Leu Trp Lys Lys Tyr Gly Asp Lys
65 70 75 80

Arg Ile Ile Asp Thr Pro Ile Ser Glu Met Gly Phe Ala Gly Ile Ala
85 90 95

Val Gly Ala Ala Met Ala Gly Leu Arg Pro Ile Cys Glu Phe Met Thr
100 105 110

Phe Asn Phe Ser Met Gln Ala Ile Asp Gln Val Ile Asn Ser Ala Ala
115 120 125

Lys Thr Tyr Tyr Met Ser Gly Gly Leu Gln Pro Val Pro Ile Val Phe
130 135 140

Arg Gly Pro Asn Gly Ala Ser Ala Gly Val Ala Ala Gln His Ser Gln
145 150 155 160

Cys Phe Ala Ala Trp Tyr Gly His Cys Pro Gly Leu Lys Val Val Ser
165 170 175

Pro Trp Asn Ser Glu Asp Ala Lys Gly Leu Ile Lys Ser Ala Ile Arg
180 185 190

Asp Asn Asn Pro Val Val Val Leu Glu Asn Glu Leu Met Tyr Gly Val
 195 200 205

Pro Phe Glu Phe Leu Pro Glu Ala Gln Ser Lys Asp Phe Leu Ile Pro
 210 215 220

Ile Gly Lys Ala Lys Ile Glu Arg Gln Gly Thr His Ile Thr Val Val
 225 230 235 240

Ser His Ser Arg Pro Val Gly His Cys Leu Glu Ala Ala Ala Val Leu
 245 250 255

Ser Lys Glu Gly Val Glu Cys Glu Val Ile Asn Met Arg Thr Ile Arg
 260 265 270

Pro Met Asp Met Glu Thr Ile Glu Ala Ser Val Met Lys Thr Asn His
 275 280 285

Leu Val Thr Val Glu Gly Gly Trp Pro Gln Phe Gly Val Gly Ala Glu
 290 295 300

Ile Cys Ala Arg Ile Met Glu Gly Pro Ala Phe Asn Phe Leu Asp Ala
 305 310 315 320

Pro Ala Val Arg Val Thr Gly Ala Asp Val Pro Met Pro Tyr Ala Lys
 325 330 335

Ile Leu Glu Asp Asn Ser Ile Pro Gln Val Lys Asp Ile Ile Phe Ala
 340 345 350

Ile Lys Lys Thr Leu Asn Ile
 355

<210> 46

<211> 366

<212> PRT

<213> S. cerevisiae

<400> 46

Met Phe Ser Arg Leu Pro Thr Ser Leu Ala Arg Asn Val Ala Arg Arg
 1 5 10 15

Ala Pro Thr Ser Phe Val Arg Pro Ser Ala Ala Ala Ala Leu Arg
 20 25 30

Phe Ser Ser Thr Lys Thr Met Thr Val Arg Glu Ala Leu Asn Ser Ala

35

40

45

Met Ala Glu Glu Leu Asp Arg Asp Asp Asp Val Phe Leu Ile Gly Glu
50 55 60

Glu Val Ala Gln Tyr Asn Gly Ala Tyr Lys Val Ser Lys Gly Leu Leu
65 70 75 80

Asp Arg Phe Gly Glu Arg Arg Val Val Asp Thr Pro Ile Thr Glu Tyr
85 90 95

Gly Phe Thr Gly Leu Ala Val Gly Ala Ala Leu Lys Gly Leu Lys Pro
100 105 110

Ile Val Glu Phe Met Ser Phe Asn Phe Ser Met Gln Ala Ile Asp His
115 120 125

Val Val Asn Ser Ala Ala Lys Thr His Tyr Met Ser Gly Gly Thr Gln
130 135 140

Lys Cys Gln Met Val Phe Arg Gly Pro Asn Gly Ala Ala Val Gly Leu
145 150 155 160

Gly Ala Gln His Ser Gln Asp Phe Ser Pro Trp Tyr Gly Ser Ile Pro
165 170 175

Gly Leu Lys Val Leu Val Pro Tyr Ser Ala Glu Asp Ala Arg Gly Leu
180 185 190

Leu Lys Ala Ala Ile Arg Asp Pro Asn Pro Val Val Phe Leu Glu Asn
195 200 205

Glu Leu Leu Tyr Gly Glu Ser Phe Glu Ile Ser Glu Glu Ala Leu Ser
210 215 220

Pro Glu Phe Thr Leu Pro Tyr Lys Ala Lys Ile Glu Arg Glu Gly Thr
225 230 235 240

Asp Ile Ser Ile Val Thr Tyr Thr Arg Asn Val Gln Phe Ser Leu Glu
245 250 255

Ala Ala Glu Ile Leu Gln Lys Lys Tyr Gly Val Ser Ala Glu Val Ile
260 265 270

Asn Leu Arg Ser Ile Arg Pro Leu Asp Thr Glu Ala Ile Ile Lys Thr
275 280 285

Val Lys Lys Thr Asn His Leu Ile Thr Val Glu Ser Thr Phe Pro Ser

290

295

300

Phe Gly Val Gly Ala Glu Ile Val Ala Gln Val Met Glu Ser Glu Ala
305 310 315 320

Phe Asp Tyr Leu Asp Ala Pro Ile Gln Arg Val Thr Gly Ala Asp Val
325 330 335

Pro Thr Pro Tyr Ala Lys Glu Leu Glu Asp Phe Ala Phe Pro Asp Thr
340 345 350

Pro Thr Ile Val Lys Ala Val Lys Glu Val Leu Ser Ile Glu
355 360 365

<210> 47

<211> 361

<212> PRT

<213> A. suum.

<400> 47

Met Ala Val Asn Gly Cys Met Arg Leu Leu Arg Asn Gly Leu Thr Ser
1 5 10 15

Ala Cys Ala Leu Glu Gln Ser Val Arg Arg Leu Ala Ser Gly Thr Leu
20 25 30

Asn Val Thr Val Arg Asp Ala Leu Asn Ala Ala Leu Asp Glu Glu Ile
35 40 45

Lys Arg Asp Asp Arg Val Phe Leu Ile Gly Glu Glu Val Ala Gln Tyr
50 55 60

Asp Gly Ala Tyr Lys Ile Ser Lys Gly Leu Trp Lys Lys Tyr Gly Asp
65 70 75 80

Gly Arg Ile Trp Asp Thr Pro Ile Thr Glu Met Ala Ile Ala Gly Leu
85 90 95

Ser Val Gly Ala Ala Met Asn Gly Leu Arg Pro Ile Cys Glu Phe Met
100 105 110

Ser Met Asn Phe Ser Met Gln Gly Ile Asp His Ile Ile Asn Ser Ala
115 120 125

Ala Lys Ala His Tyr Met Ser Ala Gly Arg Phe His Val Pro Ile Val
130 135 140

Phe Arg Gly Ala Asn Gly Ala Ala Val Gly Val Ala Gln Gln His Ser
 145 150 155 160

Gln Asp Phe Thr Ala Trp Phe Met His Cys Pro Gly Val Lys Val Val
 165 170 175

Val Pro Tyr Asp Cys Glu Asp Ala Arg Gly Leu Leu Lys Ala Ala Val
 180 185 190

Arg Asp Asp Asn Pro Val Ile Cys Leu Glu Asn Glu Ile Leu Tyr Gly
 195 200 205

Met Lys Phe Pro Val Ser Pro Glu Ala Gln Ser Pro Asp Phe Val Leu
 210 215 220

Pro Phe Gly Gln Ala Lys Ile Gln Arg Pro Gly Lys Asp Ile Thr Ile
 225 230 235 240

Val Ser Leu Ser Ile Gly Val Asp Val Ser Leu His Ala Ala Asp Glu
 245 250 255

Leu Ala Lys Ser Gly Ile Asp Cys Glu Val Ile Asn Leu Arg Cys Val
 260 265 270

Arg Pro Leu Asp Phe Gln Thr Val Lys Asp Ser Val Ile Lys Thr Lys
 275 280 285

His Leu Val Thr Val Glu Ser Gly Trp Pro Asn Cys Gly Val Gly Ala
 290 295 300

Glu Ile Ser Ala Arg Val Thr Glu Ser Asp Ala Phe Gly Tyr Leu Asp
 305 310 315 320

Gly Pro Ile Leu Arg Val Thr Gly Val Asp Val Pro Met Pro Tyr Ala
 325 330 335

Gln Pro Leu Glu Thr Ala Ala Leu Pro Gln Pro Ala Asp Val Val Lys
 340 345 350

Met Val Lys Lys Cys Leu Asn Val Gln
 355 360

<210> 48

<211> 329

<212> PRT

<213> M. capricolm

<400> 48

Met Ala Ile Ile Asn Asn Ile Lys Ala Val Thr Asp Ala Leu Asp Cys
1 5 10 15

Ala Met Gln Arg Asp Pro Asn Val Ile Val Phe Gly Glu Asp Val Gly
20 25 30

Thr Glu Gly Gly Val Phe Arg Ala Thr Gln Gly Leu Ala Val Lys Phe
35 40 45

Gly Asn Asp Arg Cys Phe Asn Ala Pro Ile Ser Glu Ala Met Phe Ala
50 55 60

Gly Val Gly Leu Gly Met Ala Met Asn Gly Met Lys Pro Val Leu Glu
65 70 75 80

Met Gln Phe Glu Gly Leu Gly Leu Ala Ser Leu Gln Asn Ile Phe Thr
85 90 95

Asn Ile Ser Arg Met Arg Asn Arg Thr Arg Gly Lys Tyr Thr Ala Pro
100 105 110

Met Val Ile Arg Met Pro Met Gly Gly Gly Ile Arg Ala Leu Glu His
115 120 125

His Ser Glu Ala Leu Glu Ala Val Tyr Ala His Ile Pro Gly Val Gln
130 135 140

Ile Val Cys Pro Ser Thr Pro Tyr Asp Thr Lys Gly Leu Ile Leu Ala
145 150 155 160

Ala Ile Asp Ser Pro Asp Pro Val Ile Val Val Glu Pro Thr Lys Leu
165 170 175

Tyr Arg Ala Phe Lys Gln Glu Val Pro Asp Glu His Tyr Ile Val Pro
180 185 190

Ile Gly Glu Gly Tyr Lys Ile Gln Glu Gly Asn Asp Leu Thr Val Val
195 200 205

Thr Tyr Gly Ala Gln Thr Val Asp Cys Gln Lys Ala Ile Ala Leu Leu
210 215 220

Lys Glu Thr His Pro Asn Ala Thr Ile Asp Leu Ile Asp Leu Arg Ser
225 230 235 240

Ile Lys Pro Trp Asp Lys Lys Met Val Ile Glu Ser Val Lys Lys Thr
245 250 255

Gly Arg Leu Leu Val Val His Glu Ala Val Lys Ser Phe Ser Val Ser
260 265 270

Ala Glu Ile Ile Ala Thr Val Asn Glu Glu Cys Phe Glu Tyr Ile Lys
275 280 285

Ala Pro Leu Ser Arg Cys Thr Gly Tyr Asp Val Ile Thr Pro Phe Asp
290 295 300

Arg Gly Glu Gly Tyr Phe Gln Val Asn Pro Lys Lys Val Leu Val Lys
305 310 315 320

Met Gln Glu Leu Leu Asp Phe Lys Phe
325

<210> 49

<211> 325

<212> PRT

<213> B. subtilis

<400> 49

Met Ala Gln Met Thr Met Val Gln Ala Ile Thr Asp Ala Leu Arg Ile
1 5 10 15

Glu Leu Lys Asn Asp Pro Asn Val Leu Ile Phe Gly Glu Asp Val Gly
20 25 30

Val Asn Gly Gly Val Phe Arg Ala Thr Glu Gly Leu Gln Ala Glu Phe
35 40 45

Gly Glu Asp Arg Val Phe Asp Thr Pro Leu Ala Glu Ser Gly Ile Gly
50 55 60

Gly Leu Ala Ile Gly Leu Ala Leu Gln Gly Phe Arg Pro Val Pro Glu
65 70 75 80

Ile Gln Phe Phe Gly Phe Val Tyr Glu Val Met Asp Ser Ile Cys Gly
85 90 95

Gln Met Ala Arg Ile Arg Tyr Arg Thr Gly Gly Arg Tyr His Met Pro
100 105 110

Ile Thr Ile Arg Ser Pro Phe Gly Gly Gly Val His Thr Pro Glu Leu
115 120 125

His Ser Asp Ser Leu Glu Gly Leu Val Ala Gln Gln Pro Gly Leu Lys

130	135	140
Val Val Ile Pro Ser Thr Pro Tyr Asp Ala Lys Gly Leu Leu Ile Ser		
145	150	155 160
Ala Ile Arg Asp Asn Asp Pro Val Ile Phe Leu Glu His Leu Lys Leu		
165	170	175
Tyr Arg Ser Phe Arg Gln Glu Val Pro Glu Gly Glu Tyr Thr Ile Pro		
180	185	190
Ile Gly Lys Ala Asp Ile Lys Arg Glu Gly Lys Asp Ile Thr Ile Ile		
195	200	205
Ala Tyr Gly Ala Met Val His Glu Ser Leu Lys Ala Ala Ala Glu Leu		
210	215	220
Glu Lys Glu Gly Ile Ser Ala Glu Val Val Asp Leu Arg Thr Val Gln		
225	230	235 240
Pro Leu Asp Ile Glu Thr Ile Ile Gly Ser Val Glu Lys Thr Gly Arg		
245	250	255
Ala Ile Val Val Gln Glu Ala Gln Arg Gln Ala Gly Ile Ala Ala Asn		
260	265	270
Val Val Ala Glu Ile Asn Glu Arg Ala Ile Leu Ser Leu Glu Ala Pro		
275	280	285
Val Leu Arg Val Ala Ala Pro Asp Thr Val Tyr Pro Phe Ala Gln Ala		
290	295	300
Glu Ser Val Trp Leu Pro Asn Phe Lys Asp Val Ile Glu Thr Ala Lys		
305	310	315 320
Lys Val Met Asn Phe		
325		

<210> 50

<211> 162

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: consensus

<400> 50

Thr Ala Leu Ala Asp Glu Glu Arg Asp Val Gly Glu Val Gly Tyr Gly
1 5 10 15

Tyr Lys Thr Lys Gly Leu Lys Gly Arg Val Asp Thr Pro Ile Glu Phe
20 25 30

Gly Gly Ala Ala Gly Leu Arg Pro Glu Met Phe Ala Asp Ile Asn Ala
35 40 45

Ala Tyr Ser Gly Gly Pro Val Arg Gly Pro Gly Ala His Ser Gln Ala
50 55 60

Pro Gly Leu Lys Val Val Pro Asp Ala Lys Gly Leu Leu Lys Ala Ala
65 70 75 80

Ile Arg Asp Asn Pro Val Leu Glu Leu Leu Tyr Glu Pro Gly Lys Ala
85 90 95

Ile Arg Gly Asp Ile Thr Ile Val Thr Tyr Ser Val Leu Ala Ala Leu
100 105 110

Gly Glu Val Ile Leu Arg Ser Pro Leu Asp Thr Ile Ser Val Lys Thr
115 120 125

Arg Leu Val Glu Glu Gly Val Gly Ala Glu Ile Ala Glu Phe Tyr Leu
130 135 140

Asp Ala Pro Arg Gly Asp Val Pro Pro Tyr Ala Leu Glu Pro Gln Ile
145 150 155 160

Ala Lys

<210> 51

<211> 352

<212> PRT

<213> Arabidopsis thaliana

<400> 51

Met Ala Ala Leu Leu Gly Arg Ser Cys Arg Lys Leu Ser Phe Pro Ser
1 5 10 15

Leu Thr His Gly Ala Arg Arg Val Ser Thr Glu Thr Gly Lys Pro Leu
20 25 30

Asn Leu Tyr Ser Ala Ile Asn Gln Ala Leu His Ile Ala Leu Asp Thr
35 40 45

Asp Pro Arg Ser Tyr Val Phe Gly Glu Asp Val Gly Phe Gly Gly Val
50 55 60

Phe Arg Cys Thr Thr Gly Leu Ala Glu Arg Phe Gly Lys Asn Arg Val
65 70 75 80

Phe Asn Thr Pro Leu Cys Glu Gln Gly Ile Val Gly Phe Gly Ile Gly
85 90 95

Leu Ala Ala Met Gly Asn Arg Ala Ile Val Glu Ile Gln Phe Ala Asp
100 105 110

Tyr Ile Tyr Pro Ala Phe Asp Gln Ile Val Asn Glu Ala Ala Lys Phe
115 120 125

Arg Tyr Arg Ser Gly Asn Gln Phe Asn Cys Gly Gly Leu Thr Ile Arg
130 135 140

Ala Pro Tyr Gly Ala Val Gly His Gly Gly His Tyr His Ser Gln Ser
145 150 155 160

Pro Glu Ala Phe Phe Cys His Val Pro Gly Ile Lys Val Val Ile Pro
165 170 175

Arg Ser Pro Arg Glu Ala Lys Gly Leu Leu Leu Ser Cys Ile Arg Asp
180 185 190

Pro Asn Pro Val Val Phe Phe Glu Pro Lys Trp Leu Tyr Arg Gln Ala
195 200 205

Val Glu Glu Val Pro Glu His Asp Tyr Met Ile Pro Leu Ser Glu Ala
210 215 220

Glu Val Ile Arg Glu Gly Asn Asp Ile Thr Leu Val Gly Trp Gly Ala
225 230 235 240

Gln Leu Thr Val Met Glu Gln Ala Cys Leu Asp Ala Glu Lys Glu Gly
245 250 255

Ile Ser Cys Glu Leu Ile Asp Leu Lys Thr Leu Leu Pro Trp Asp Lys
260 265 270

Glu Thr Val Glu Ala Ser Val Lys Lys Thr Gly Arg Leu Leu Ile Ser
275 280 285

His Glu Ala Pro Val Thr Gly Gly Phe Gly Ala Glu Ile Ser Ala Thr
290 295 300

Ile Leu Glu Arg Cys Phe Leu Lys Leu Glu Ala Pro Val Ser Arg Val
305 310 315 320

Cys Gly Leu Asp Thr Pro Phe Pro Leu Val Phe Glu Pro Phe Tyr Met
325 330 335

Pro Thr Lys Asn Lys Ile Leu Asp Ala Ile Lys Ser Thr Val Asn Tyr
340 345 350

<210> 52

<211> 392

<212> PRT

<213> Human

<400> 52

Met Ala Val Val Ala Ala Ala Ala Gly Trp Leu Leu Arg Leu Arg Ala
1 5 10 15

Ala Gly Ala Glu Gly His Trp Arg Arg Leu Pro Gly Ala Gly Leu Ala
20 25 30

Arg Gly Phe Leu His Pro Ala Ala Thr Val Glu Asp Ala Ala Gln Arg
35 40 45

Arg Gln Val Ala His Phe Thr Phe Gln Pro Asp Pro Glu Pro Arg Glu
50 55 60

Tyr Gly Gln Thr Gln Lys Met Asn Leu Phe Gln Ser Val Thr Ser Ala
65 70 75 80

Leu Asp Asn Ser Leu Ala Lys Asp Pro Thr Ala Val Ile Phe Gly Glu
85 90 95

Asp Val Ala Phe Gly Gly Val Phe Arg Cys Thr Val Gly Leu Arg Asp
100 105 110

Lys Tyr Gly Lys Asp Arg Val Phe Asn Thr Pro Leu Cys Glu Gln Gly
115 120 125

Ile Val Gly Phe Gly Ile Gly Ile Ala Val Thr Gly Ala Thr Ala Ile
130 135 140

Ala Glu Ile Gln Phe Ala Asp Tyr Ile Phe Pro Ala Phe Asp Gln Ile

145	150	155	160
Val Asn Glu Ala Ala Lys Tyr Arg Tyr Arg Ser Gly Asp Leu Phe Asn			
165	170	175	
Cys Gly Ser Leu Thr Ile Arg Ser Pro Trp Gly Cys Val Gly His Gly			
180	185	190	
Ala Leu Tyr His Ser Gln Ser Pro Glu Ala Phe Phe Ala His Cys Pro			
195	200	205	
Gly Ile Lys Val Val Ile Pro Arg Ser Pro Phe Gln Ala Lys Gly Leu			
210	215	220	
Leu Leu Ser Cys Ile Glu Asp Lys Asn Pro Cys Ile Phe Phe Glu Pro			
225	230	235	240
Lys Ile Leu Tyr Arg Ala Ala Ala Glu Glu Val Pro Ile Glu Pro Tyr			
245	250	255	
Asn Ile Pro Leu Ser Gln Ala Glu Val Ile Gln Glu Gly Ser Asp Val			
260	265	270	
Thr Leu Val Ala Trp Gly Thr Gln Val His Val Ile Arg Glu Val Ala			
275	280	285	
Ser Met Ala Lys Glu Lys Leu Gly Val Ser Cys Glu Val Ile Asp Leu			
290	295	300	
Arg Thr Ile Ile Pro Trp Asp Val Asp Thr Ile Cys Lys Ser Val Ile			
305	310	315	320
Lys Ser Gly Arg Leu Leu Ile Ser His Glu Ala Pro Leu Thr Gly Gly			
325	330	335	
Phe Ala Ser Glu Ile Ser Ser Thr Val Gln Glu Glu Cys Phe Leu Asn			
340	345	350	
Leu Glu Ala Pro Ile Ser Arg Val Cys Gly Tyr Asp Thr Pro Phe Pro			
355	360	365	
His Ile Phe Glu Pro Phe Tyr Ile Pro Asp Lys Trp Lys Cys Tyr Asp			
370	375	380	
Ala Leu Arg Lys Met Ile Asn Tyr			
385	390		

<210> 53
<211> 391
<212> PRT
<213> Bovine

<400> 53

Met Ala Ala Val Ala Ala Phe Ala Gly Trp Leu Leu Arg Leu Arg Ala
1 5 10 15

Ala Gly Ala Asp Gly Pro Trp Arg Arg Leu Cys Gly Ala Gly Leu Ser
20 25 30

Arg Gly Phe Leu Gln Ser Ala Ser Ala Tyr Gly Ala Ala Gln Arg Arg
35 40 45

Gln Val Ala His Phe Thr Phe Gln Pro Asp Pro Glu Pro Val Glu Tyr
50 55 60

Gly Gln Thr Gln Lys Met Asn Leu Phe Gln Ala Val Thr Ser Ala Leu
65 70 75 80

Asp Asn Ser Leu Ala Lys Asp Pro Thr Ala Val Ile Phe Gly Glu Asp
85 90 95

Val Ala Phe Gly Gly Val Phe Arg Cys Thr Val Gly Leu Arg Asp Lys
100 105 110

Tyr Gly Lys Asp Arg Val Phe Asn Thr Pro Leu Cys Glu Gln Gly Ile
115 120 125

Val Gly Phe Gly Ile Gly Ile Ala Val Thr Gly Ala Thr Ala Ile Ala
130 135 140

Glu Ile Gln Phe Ala Asp Tyr Ile Phe Pro Ala Phe Asp Gln Ile Val
145 150 155 160

Asn Glu Ala Ala Lys Tyr Arg Tyr Arg Ser Gly Asp Leu Phe Asn Cys
165 170 175

Gly Ser Leu Thr Ile Arg Ser Pro Trp Gly Cys Val Gly His Gly Ala
180 185 190

Leu Tyr His Ser Gln Ser Pro Glu Ala Phe Phe Ala His Cys Pro Gly
195 200 205

Ile Lys Val Val Val Pro Arg Ser Pro Phe Gln Ala Lys Gly Leu Leu
210 215 220

Leu Ser Cys Ile Glu Asp Lys Asn Pro Cys Ile Phe Phe Glu Pro Lys
 225 230 235 240

Ile Leu Tyr Arg Ala Ala Val Glu Gln Val Pro Val Glu Pro Tyr Asn
 245 250 255

Ile Pro Leu Ser Gln Ala Glu Val Ile Gln Glu Gly Ser Asp Val Thr
 260 265 270

Leu Val Ala Trp Gly Thr Gln Val His Glu Ile Arg Glu Val Ala Ala
 275 280 285

Met Ala Gln Glu Lys Leu Gly Val Ser Cys Glu Val Ile Asp Leu Arg
 290 295 300

Thr Ile Leu Pro Trp Asp Val Asp Thr Val Cys Lys Ser Val Ile Lys
 305 310 315 320

Thr Gly Arg Leu Leu Val Ser His Glu Ala Pro Leu Thr Gly Gly Phe
 325 330 335

Ala Ser Glu Ile Ser Ser Thr Val Gln Glu Gln Cys Phe Leu Asn Leu
 340 345 350

Glu Ala Pro Ile Ser Arg Val Cys Gly Tyr Asp Thr Pro Phe Pro His
 355 360 365

Ile Phe Glu Pro Phe Tyr Ile Pro Asp Lys Trp Lys Cys Tyr Asp Ala
 370 375 380

Leu Arg Lys Met Ile Asn Tyr
 385 390

<210> 54

<211> 375

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: consensus

<400> 54

Met Ala Ala Val Ala Ala Ala Gly Trp Leu Leu Arg Leu Arg Ala Ala
 1 5 10 15

Gly Ala Gly Trp Arg Arg Leu Gly Ala Gly Leu Arg Gly Phe Leu Ala
 20 25 30

Ala Ala Gln Arg Arg Gln Val Ala His Phe Thr Phe Gln Pro Asp Pro
35 40 45

Glu Pro Glu Tyr Gly Gln Thr Gln Lys Met Asn Leu Phe Gln Ala Val
50 55 60

Thr Ser Ala Leu Asp Asn Ser Leu Ala Lys Asp Pro Thr Ala Val Ile
65 70 75 80

Phe Gly Glu Asp Val Ala Phe Gly Gly Val Phe Arg Cys Thr Val Gly
85 90 95

Leu Arg Asp Lys Tyr Gly Lys Asp Arg Val Phe Asn Thr Pro Leu Cys
100 105 110

Glu Gln Gly Ile Val Gly Phe Gly Ile Gly Ile Ala Val Thr Gly Ala
115 120 125

Thr Ala Ile Ala Glu Ile Gln Phe Ala Asp Tyr Ile Phe Pro Ala Phe
130 135 140

Asp Gln Ile Val Asn Glu Ala Ala Lys Tyr Arg Tyr Arg Ser Gly Asp
145 150 155 160

Leu Phe Asn Cys Gly Ser Leu Thr Ile Arg Ser Pro Trp Gly Cys Val
165 170 175

Gly His Gly Ala Leu Tyr His Ser Gln Ser Pro Glu Ala Phe Phe Ala
180 185 190

His Cys Pro Gly Ile Lys Val Val Ile Pro Arg Ser Pro Phe Gln Ala
195 200 205

Lys Gly Leu Leu Leu Ser Cys Ile Glu Asp Lys Asn Pro Cys Ile Phe
210 215 220

Phe Glu Pro Lys Ile Leu Tyr Arg Ala Ala Val Glu Glu Val Pro Glu
225 230 235 240

Pro Tyr Asn Ile Pro Leu Ser Gln Ala Glu Val Ile Gln Glu Gly Ser
245 250 255

Asp Val Thr Leu Val Ala Trp Gly Thr Gln Val His Val Ile Arg Glu
260 265 270

Val Ala Met Ala Glu Lys Leu Gly Val Ser Cys Glu Val Ile Asp Leu
275 280 285

Leu Arg Lys Met Ile Asn Tyr
370 375